

REMARKS

Applicant has carefully reviewed the Office Action mailed January 3, 2011 and offers the following remarks.

Claims 1-5, 7-18, and 20-26 were rejected. Applicant wishes to thank the Examiner for indicating that claims 6 and 19 would be allowable if rewritten in independent form. Applicant reserves the right to rewrite claims 6 and 19 at a later time. However, in light of the below remarks, Applicant believes that all pending claims 1-5, 7-18, and 20-26 are allowable.

Claims 1-5, 7-13, 14-18, and 20-26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Canadian Patent No. 2,404,055 to Walton et al. (hereinafter "Walton") in view of U.S. Patent Application Publication No. 2008/0181170 to Branolund et al. (hereinafter "Branlund"). Applicant respectfully traverses. When rejecting a claim under § 103, the Patent Office must either show that the prior art references teach or suggest all limitations of the claim or explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418, 82 U.S.P.Q.2d (BNA) 1385 (2007).

Before addressing the rejection, Applicant provides a brief summary of the embodiments disclosed in the current application. The disclosed embodiments provide a technique for scheduling data, and in particular, scheduling real-time or voice data for transmissions during a transmit time interval in a multi-carrier communication environment, such as an OFDM communication environment. For each transmit time interval, channel condition indicia for multiple users is determined, and an iterative scheduling process is then implemented based in part on the channel condition indicia. The iterative scheduling initially pre-assigns select OFDM tones for each of the remaining users that have not been permanently assigned tones for the given transmit time interval. The OFDM tones assigned to each user may be assigned in groups corresponding to channels. These channels define available tones throughout the transmit time interval. The transmit time interval is broken into time segments, referred to as blocks, wherein all of the available sub-carriers in the available OFDM spectrum are repeated for each block. Each sub-carrier in the resulting time-frequency continuum is referred to as a tone. If the tones are grouped into channels, channels may include tones over any number of frequencies or blocks. After the iterative scheduling initially pre-assigns select OFDM tones for each of the remaining

users that have not been permanently assigned tones for the given transmit time interval, the remaining user having the least favorable channel conditions is selected as an active user. The newly selected active user is then permanently assigned the select OFDM tones that were initially pre-assigned to that particular user. The permanently assigned OFDM tones are removed from consideration, and the process is repeated until all the remaining users are permanently assigned unique OFDM tones. At this point, scheduling may be initiated.

Claim 1 is representative and recites a method for scheduling data for transmission during a transmit time interval in a multi-carrier communication environment comprising:

determining channel condition indicia for a plurality of users;

in an iterative manner:

pre-assigning select OFDM tones for each remaining user of the plurality of users that has not been permanently assigned tones for the transmit time interval;

selecting a remaining user having least favorable channel conditions as an active user; and

permanently assigning to the active user the select OFDM tones pre-assigned to the active user, wherein once the select OFDM tones are permanently assigned to the active user, the active user is no longer a remaining user.

The combination of Walton and Branolund does not teach or suggest performing the claimed pre-assigning, selecting, and permanently assigning steps in an iterative manner as recited in claim 1. The Patent Office alleges page 27, lines 5-6 of Walton discloses that these claimed steps are performed in an iterative manner, as recited in claim 1 (Office Action mailed January 3, 2011, pp. 3-4). Applicant respectfully disagrees.

Walton does disclose a method for scheduling data transmissions and that the assignment of resources to users can be based on a number of factors, such as priority assigned to active users, fairness criteria, and channel metrics (Walton, page 31, lines 18-27). Walton also discloses “an iterative process.” (Walton, page 27, lines 5-6). However, the iterative process disclosed in Walton is not the claimed iterative process. Walton does not disclose performing the claimed pre-assigning, selecting, and permanently assigning steps in an iterative manner as recited in claim 1. Instead, the iterative process in Walton is limited to “computing back-off factors” in order to reduce the “imbalance in effective link margins.” (Walton, page 26, line 24 through page 27, line 8). The cited portion of Walton does not relate to the pre-assigning,

selecting, and permanent assigning steps of the claimed invention. The cited portion of Walton relates to addressing the imbalance in effective link margins. The imbalance in effective link margins is reduced by iteratively computing the back-off factors. The cells and channels having higher effective link margins will have their transmit powers reduced accordingly. *Ibid.* Thus, Walton discloses an iterative process, but the iterative process is computing back-off factors, not pre-assigning OFDM tones, selecting a remaining user having least favorable channel conditions as an active user, and permanent assigning OFDM tones. Walton does not teach or suggest performing the claimed pre-assigning, selecting, and permanently assigning steps in an iterative manner. Branolund does not cure the deficiencies of Walton in this regard. Therefore, claim 1 is patentable.

In addition, Walton does not disclose “pre-assigning select OFDM tones for each remaining user of the plurality of users that has not been permanently assigned tones for the transmit time interval” and “permanently assigning to the active user the select OFDM tones pre-assigned to the active user, wherein once the select OFDM tones are permanently assigned to the active user, the active user is no longer a remaining user” in an iterative manner, as recited in claim 1. Walton does disclose that a data processor “assigns each channel data stream to one or more sub-channels, at one or more time slots, and on one or more antennas.” (Walton, page 74, lines 6-8). “After assigning each channel data stream to its respective time slot(s), sub-channel(s), and antenna(s), the data in the channel data stream is modulated using multi-carrier modulation.” (Walton, page 74, lines 21-23). In addition, each element of the modulation symbol vector is associated with a specific sub-channel having a unique frequency or tone on which the modulation symbols are conveyed. (Walton, page 75, lines 4-6). However, the cited portions of Walton do not disclose or suggest that select tones are pre-assigned to the active user and then are later permanently assigned to the active user in an iterative manner, wherein once the select tones are permanently assigned to the active user, the active user is no longer a remaining user, as is required by claim 1. The cited portions of Walton are silent as to pre-assigning and permanently assigned select tones in an iterative manner. There is no mention in the cited portions of Walton of pre-assigning or permanent assigning of select tones. Walton merely discloses that each element of the modulation symbol vector is associated with a specific sub-channel having a unique frequency or tone. Walton does not disclose or suggest any “pre-assigning,” nor does Walton disclose pre-assigning select tones to each remaining user, as

recited by the claimed invention. Thus, Walton does not teach or suggest the limitations for which it is cited. Branolund does not cure the deficiencies of Walton in this regard. Claim 1 is therefore not obvious in view of Walton and Branolund.

Moreover, Walton does not disclose or suggest “selecting a remaining user having least favorable channel conditions as an active user” in an iterative manner. The Patent Office alleges that page 46, lines 15-22 of Walton discloses this step (Office Action mailed January 3, 2011, p. 4). Applicant respectfully disagrees. In the claimed invention, in each iteration, the remaining user having the least favorable channel conditions is selected as an active user and then the select OFDM tones pre-assigned to the active user are permanently assigned to the active user. The cited portion of Walton merely discloses that channels may be assigned to users with zero or more conditions or constraints on usage, such conditions including limitation on the data rate, a maximum transmit power, a restriction on the set point, and so on. There is no teaching or suggestion in the cited portion of Walton that the user having the least favorable channel conditions is selected as an active user. Branolund also does not teach or suggest this limitation. Claim 1 is thus patentable for this additional reason.

The combination of Walton and Branolund also does not disclose or suggest “permanently assigning to the active user the select OFDM tones pre-assigned to the active user,” as recited in claim 1. The Patent Office admits that Walton does not disclose or suggest this limitation, but alleges that Branolund discloses this limitation (Office Action mailed January 3, 2011, pp. 4-5). Applicant respectfully disagrees.

Branlund, like Walton, does not teach or suggest the iterative process claimed in independent claims 1 and 14. Branolund, alone or in combination with Walton, does not teach or suggest that the pre-assigning, selecting, and permanent assigning steps are all done “in an iterative manner,” as required by claim 1. The Patent Office cites to paragraph 0150 of Branolund as allegedly teaching “permanently assigning to the active user the select OFDM tones pre-assigned to the active user” (Office Action mailed January 3, 2011, pp. 4-5). The cited portion of Branolund does not teach or suggest “permanently assigning to the active user the select OFDM tones pre-assigned to the active user,” as recited in claim 1. The cited portion of Branolund discloses that every active user is assigned a preamble sequence and a designated partition for requesting system access (Branlund, paragraph 0150). There is no mention in paragraph 0150 of Branolund of pre-assigning and permanent assigning of select OFDM tones, as

recited in claim 1. The user in Branolund is assigned a preamble sequence and a designated partition. There is no teaching or suggestion of select OFDM tones being assigned; the preamble sequence and the designated partition are not equivalent to the claimed select OFDM tones. Moreover, there is no teaching or suggestion in Branolund that the preamble sequence and the designated partition are pre-assigned and then permanently assigned. Thus, Branolund does not teach or suggest “permanently assigning to the active user the select OFDM tones pre-assigned to the active user” in an iterative manner. Since Branolund does not teach or suggest this limitation, and the Patent Office has admitted that Walton does not teach or suggest this limitation, claim 1 is therefore patentable for this additional reason.

In summary, both Walton and Branolund are silent as to pre-assigning select OFDM tones and then, after selecting a remaining user having least favorable channel conditions as an active user, permanently assigning to the active user the select OFDM tones pre-assigned to the active user, as recited in the claimed invention. In the claimed invention, the pre-assigning, selecting, and permanent assigning steps are done in an iterative manner until all users have been permanently assigned the select OFDM tones. In particular, in each iteration, the remaining user that has the least favorable channel conditions is selected as an active user and is permanently assigned the select OFDM tones pre-assigned to the active user. Neither Walton nor Branolund discloses or suggests these limitations. Neither Walton nor Branolund teaches or suggest the concepts of pre-assigning select OFDM tones, and then a later step of permanently assigning the pre-assigned select OFDM tones. There is no teaching or suggestion in Walton or Branolund that multiple iterations are performed in which the remaining user that has the least favorable channel conditions is selected as an active user and is permanently assigned the select OFDM tones pre-assigned to the active user in each iteration, as recited in the claimed invention. Claim 1 is thus patentable for this additional reason.

Claim 1 is patentable for the reasons set forth above. Claim 14 is an independent system claim that recites similar limitations as the limitations of claim 1. Claim 14 thus patentable for at least the same reasons set forth above with respect to claim 1.

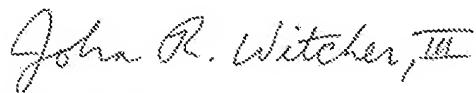
Claims 2-5 and 7-13 depend from claim 1 and recite all of the limitations of claim 1. Claims 15-18 and 20-26 depend from claim 14 and recite all of the limitations of claim 14. Claims 2-5, 7-13, 15-18, and 20-26 are thus patentable for at least the same reasons set forth above with respect to claims 1 and 14.

The present application is now in condition for allowance and such action is respectfully requested. The Examiner is encouraged to contact Applicant's representative regarding any remaining issues in an effort to expedite allowance and issuance of the present application.

Respectfully submitted,

WITHROW & TERRANOVA, P.L.L.C.

By:



John R. Witcher, III
Registration No. 39,877
100 Regency Forest Drive, Suite 160
Cary, NC 27518
Telephone: (919) 238-2300

Date: April 4, 2011

Attorney Docket: 7000-354-1A